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IGNITE:AMSTERDAM

Market Risk in Lending Protocols

Amit Chaudhary, Head of Defi Research, Polygon

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SaFe DeFi For All

Stability | Finance

AMIT CHAUDHARY

Head of DeFi Research

Financial stability and DeFi

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DeFi has seen exponential growth

TVL: $163 Billion

The dilemma of Scalability and Stability

Network effect : Risk can propagate very quickly and widely

Financial stability is the public good

Whole ecosystem benefits

Need for risk assessment framework in DeFi

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Making DeFi protocols robust to handle market uncertainty

What are the risks?

Major critique from regulators & Central Banks

Can we proactively address financial stability concerns?

Increasing capital efficiency

Overcollateralization is frequently seen: Can we dynamically reduce the amount of collateral when risk is low?

Risk assessment framework

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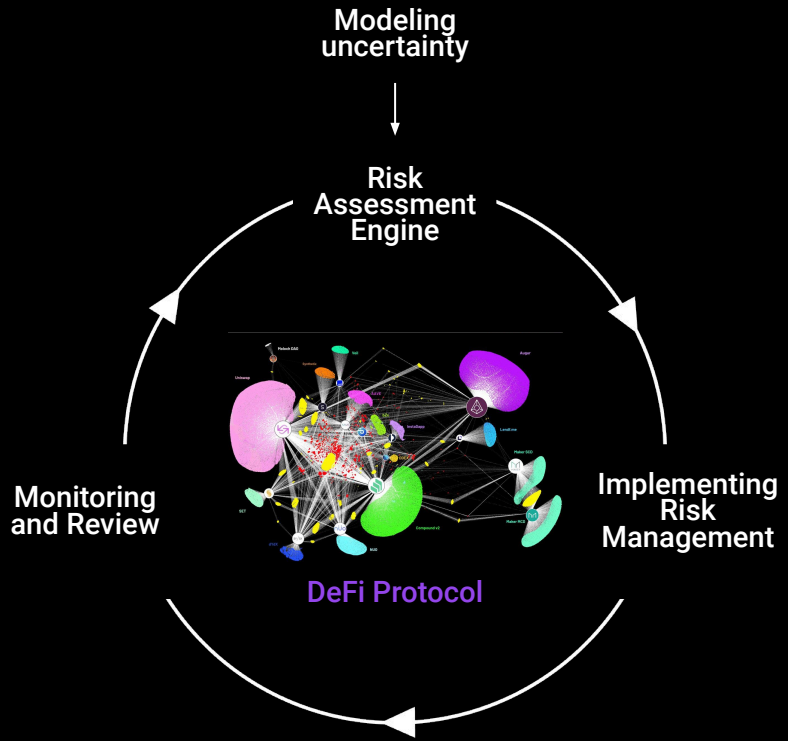

Solution

OVIX lending Protocol

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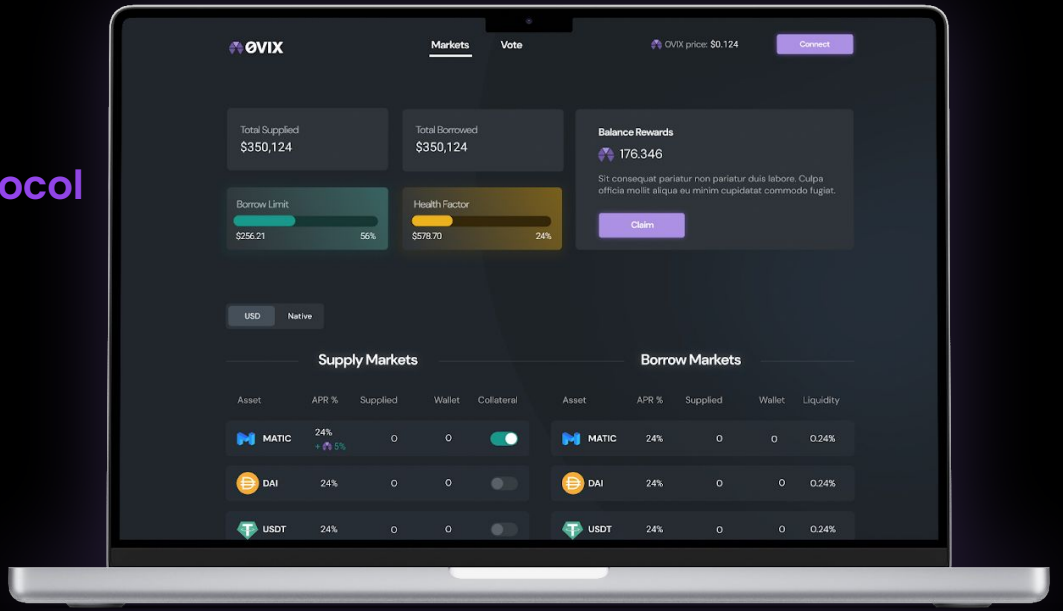
We applied the Framework to the Lending Protocol

- Secure Tech
- Smart Tokenomics
- Frictionless UX
- Core Polygon Money-Market Protocol



Key techniques

Agent based simulation

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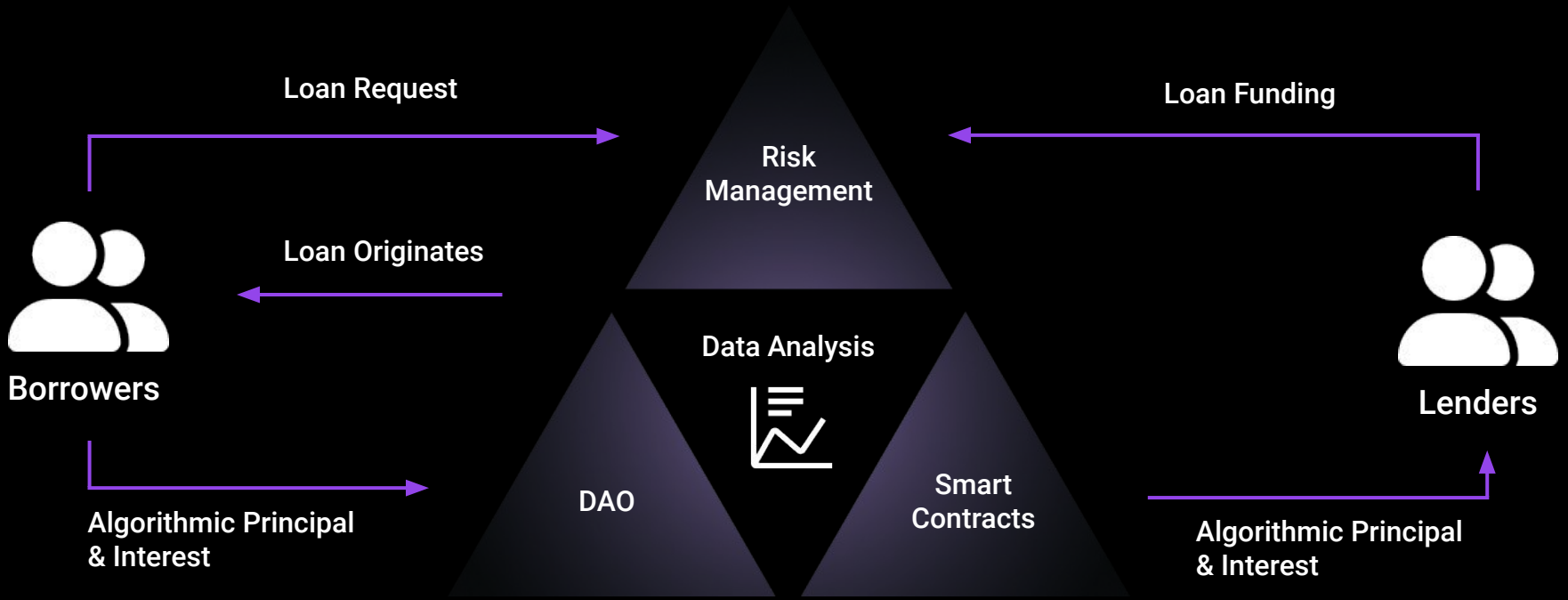

ØVIX

Key techniques

Multi-asset approach

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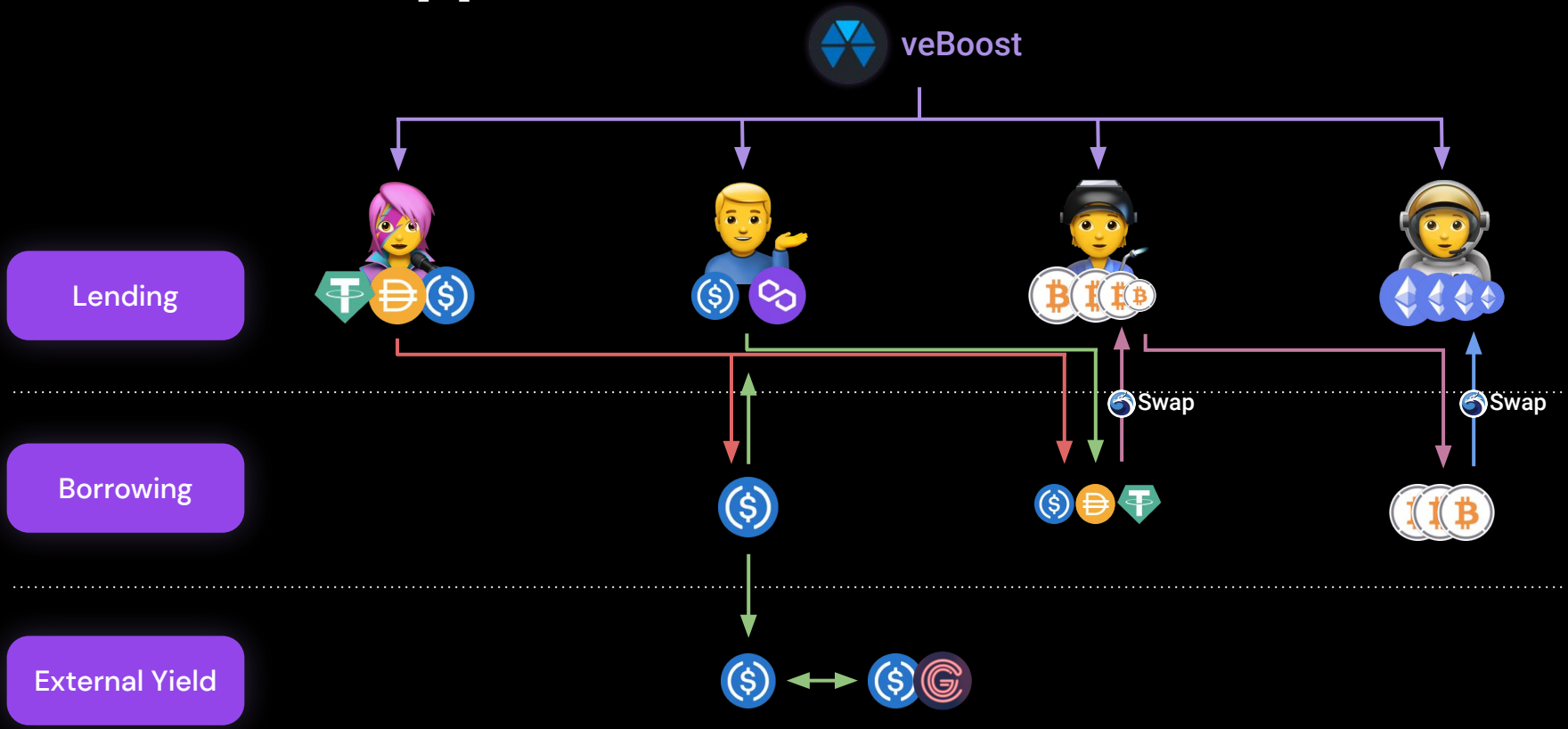

Market risk assessment model

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ACTIVITY & LIQUIDATION DATA

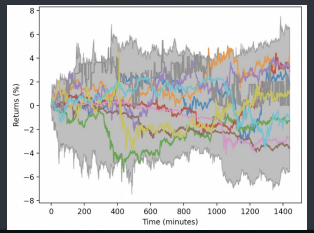
PERFORMANCE METRICS

- LTV
- TOTAL LIQUIDATIONS
- UNDER COLLATERALIZATION RISK

PROTOCOL PANRAMETERS

SIMULATION ENGINE

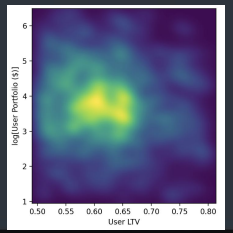
PRICE TRAJECTORIES



USER ACTIONS

- DEPOSIT
- BORROW
- SWAP

USER PORTFOLIOS



SLIPPAGE FEES

LIQUIDATORS

Market risk assessment

A multi-asset, agent-based approach applied to the 0VIX lending protocol

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We assess the market risk of the 0VIX lending protocol using a multi-asset agent- based model to simulate ensembles of users subject to price-driven liquidation risk. Our multi-asset methodology shows that the protocol's systemic risk is small under stress and that enough collateral is always present to underwrite active loans. Our simulations use a wide variety of historical data to model the market volatility and run the agent-based simulation to show that even if all the assets like ETH, BTC and MATIC increase their hourly volatility by more than 10x times, the protocol has less than 1% chance of default.

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Daniele Pinna

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Market risk assessment: A multi-asset, agent-based approach applied to the 0VIX lending protocol

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April 18, 2022

Abstract

We assess the market risk of the 0VIX lending protocol using a multi-asset agent-based model to simulate ensembles of users subject to price-driven liquidation risk. Our multi-asset methodology shows that the protocol's systemic risk is small under stress and that enough collateral is always present to underwrite active loans. Our simulations use a wide variety of historical data to model the market volatility and run the agent-based simulation to show that even if all the assets like ETH, BTC and MATIC increase their hourly volatility by more than 10x times, the protocol has less than 1% chance of default.

1 Introduction

DeFi lending protocols have seen a significant flow of capital. The lending system's stability will depend on the collateral value that the borrowers provide. At any point in time, the system must have adequate capital to become solvent. Recently [1], research has attempted to estimate the financial risk on lending protocols associated with asset price fluctuations using Agent-based simulations. However, examples assume only two assets (one being the numeraire) being supplied and borrowed in the individual lending market. In reality, users can supply multi assets to the lending market and borrow multiple assets. Sometimes even the same asset is both borrowed and lent to capitalize on temporary incentive mechanisms aimed at attracting liquidity onto the lending market. This paper presents an enhanced multi-asset model where real-time liquidation calls are executed as a result of price turbulence and borrowers face periods where they need to raise cash to remain within the tolerance limit of the protocol parameters like collateral ratio. As a case study, we model these dynamics on the 0VIX[2] lending protocol.

We show how one can ensure the lending market's resilience to adverse shocks even when multiple assets become highly volatile simultaneously. This is done by exploring portions of the phase space of 0VIX's asset-specific parameters and optimizing them by requiring that over-collateralization is retained across a wide range of simulated price volatilities while minimizing the liquidation penalties to individual users. Analyses such as that presented here can be performed periodically on a running basis to offer individual users key insights into the risk of their portfolio positions, as well as propose recalibrations of protocol parameters for discerning governance participants. We believe

[1] Kao, Chitra, Chiang, and Morrow (2020)

[2] 0VIX is the decentralized, Polygon blockchain based open-source lending and borrowing protocol enhanced with veTokenomics, interest rate optimization curve beta ,DAO Treasury management.

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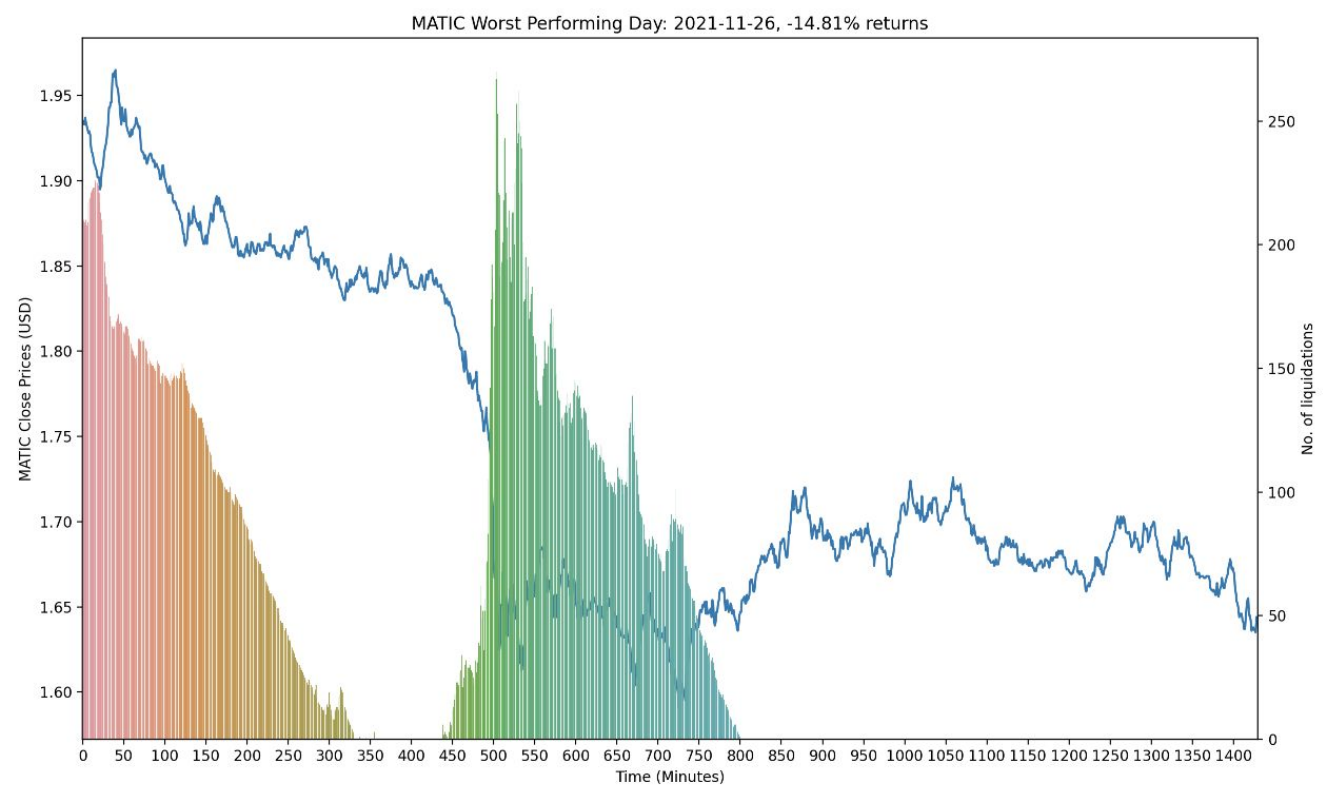
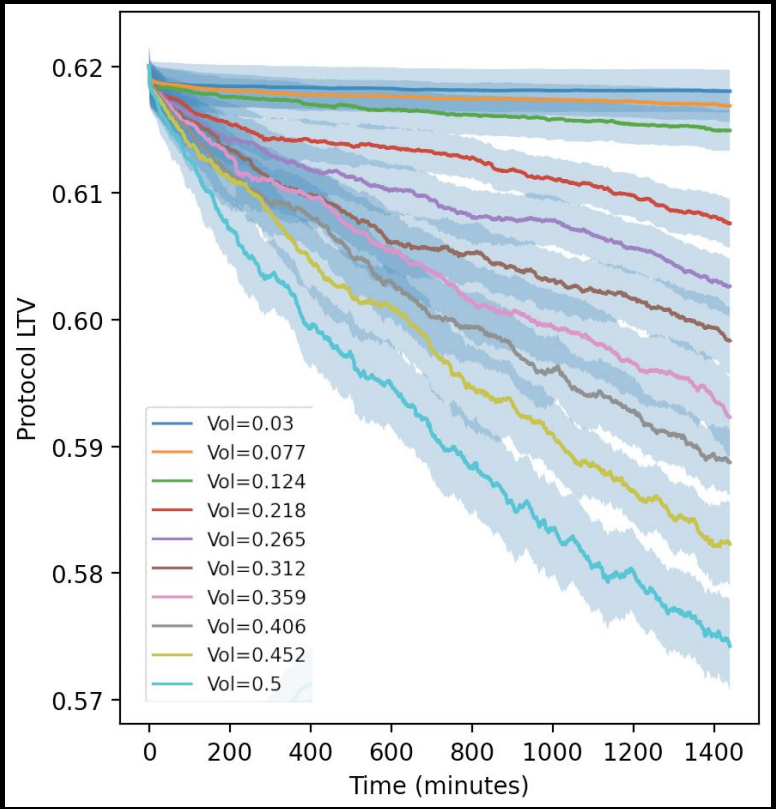
Results

Liquidations



Results

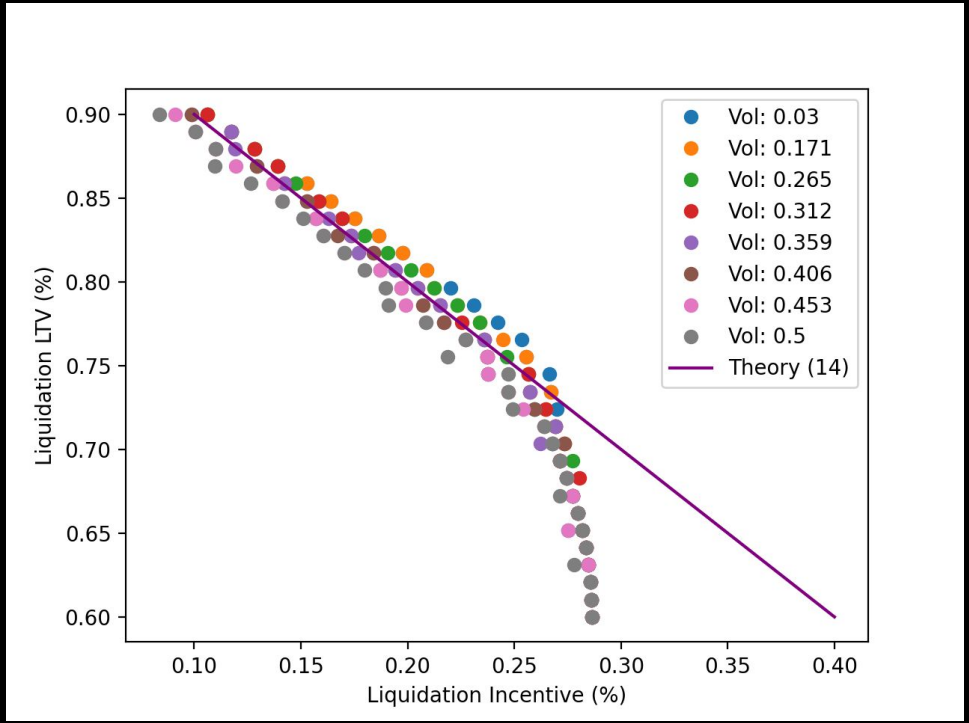
Protocol Health



Results

Protocol parameters optimisation

Theory meets Empirics



Revisiting risk assessment framework

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Modeling uncertainty

Risk Assessment Engine

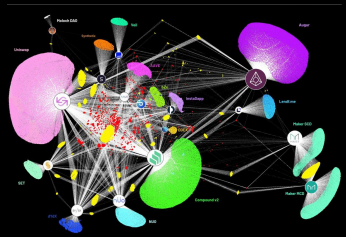
Implementing Risk Management

Risk Dashboard

Monitoring and Review

DAO Framework

Parameter Optimisation



DeFi Protocol

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Thank you!

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